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## Extra-terrestrial solar event triggered Uttarakhand cloudburst

**Subhra Priyadarshini**

Unplanned human activities in the Himalayan terrain coupled with some unusual extra-terrestrial events triggered the massive cloudburst over Kedarnath resulting in the catastrophic 2013 floods in Uttarakand region of India, according to new research<sup>1</sup>.

Using NASA satellite data, Saumitra Mukherjee from the School of Environmental Sciences at New Delhi's Jawaharlal Nehru University (JNU) suggests that a sudden rise in 'proton flux' from the Sun was responsible for the catastrophe. The change in land use pattern (such as construction of reservoirs on the Ganges and Alaknanda rivers) added fuel to fire and created havoc in Uttarakhand.

"The rise in proton flux – an unusual solar event where protons emitted by the Sun are accelerated to very high energies – was responsible for the anomalous rise in atmospheric temperature. High concentration of aerosol trapped in the atmosphere and glaciers in Indo-China border initiated a nucleation process in the concentrated water vapour to trigger formation of clouds for the torrential rain and cloud burst on 16 and 17 June 2013," Mukherjee told *Nature India*.

NASA's Sun Observatory Heliospheric Observatory (SOHO) satellite recorded a steep rise in solar proton flux above 10 MeV for 12 days from May 15 to 26). During the same period, the cosmic ray intensity was also recorded at an all-time high at New Delhi's Jawaharlal Nehru University (JNU), which represents the regional cosmic ray data in the Space Environment Viewing and Analysis Network (SEVAN) of the Asian office of Aerospace Research.

This was just before the anomalous rise in atmospheric temperature in the Himalayan region, which Mukherjee says was initiated by the release of heat energy from the trapped proton drift. "After this event anomalous rise in

cosmic ray was recorded. Rise in cosmic rays was instrumental in condensation of the clouds leading to the cloudburst in Kedarnath," he explains.

The scientist suggests that it took 20 days and 6 hours for the mechanism (of heat transfer to cloud appearance) to initiate the cloudburst in Kedarnath. The heat from the Sun was captured in the 'Van Allen's belt' (between the Sun and Earth), which further accelerated the protons. This extra-terrestrial influence led to rise in temperature to release the aerosol trapped in the glaciers and atmosphere in the Indo-China border to initiate the cloudburst.

Generally, increase in aerosol heating over the Indo-Gangatic plains in the pre-monsoon period leads to a strengthening of the Indian monsoon. The heat transfer from the protons to the atmosphere has affected not only the atmospheric water vapour but has been responsible for melting of glaciers which feed the river Ganges.

Mukherjee says the influence of the Sun, along with anthropogenic activities, on climate change needs more study, especially its manifestation in torrential rains. "This is a radical departure from previous principles but is consistent with existing observations," he adds. Mukherjee says his hypothesis does not change the general conclusion that increased proton flux from the Sun reserves trapped heat in geospecific locations which influence temporary change in the atmosphere.

The Kedarnath extreme weather event is a clear manifestation of climate change, he adds.

The devastating flood in Uttarakhand in was a combined impact of cloudburst in Uttarakhand, quick melting of glaciers at high altitude due to beating of ice sheet by raindrops and breaching of natural embankment of Chorabari Tal (north of Kedarnath) due to accumulation of excess surface runoff. Within 48 hours, 280 mm rainfall was recorded and about five feet of snow precipitated at higher altitudes.

Apart from Uttarakhand, Himachal Pradesh, northeast Rajasthan and Delhi also received torrential rainfall. In Delhi, it was an advent of early monsoon that broke the past record of 150 years.



Saumitra Mukherjee (right) with SEVAN scientists Karen Arakelyan (left) and David Pokhcaryan (middle)  
JNU

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